

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference E-2439/04	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/EP2004/052561	International filing date (<i>day/month/year</i>) 15.10.2004	Priority date (<i>day/month/year</i>) 17.10.2003	
International Patent Classification (IPC) or national classification and IPC F16H7/12			
Applicant DAYCO EUROPE S.R.L. CON UNICO SOCIO et al.			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 4 sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. <input checked="" type="checkbox"/> <i>sent to the applicant and to the International Bureau</i> a total of 4 sheets, as follows: <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).			
4. This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the opinion <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application			
Date of submission of the demand 08.08.2005		Date of completion of this report 25.11.2005	
Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016 </div> </div>		Authorized Officer Goeman, F Telephone No. +31 70 340-4086	



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/052561

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1, 3-8	as originally filed
2, 2a	received on 08.08.2005 with letter of 08.08.2005

Claims, Numbers

1-6	received on 08.08.2005 with letter of 08.08.2005
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Drawings, Sheets

1/3-3/3	as originally filed
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- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/052561

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-6
	No: Claims	
Inventive step (IS)	Yes: Claims	1-6
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-6
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Reference is made to the following documents:
D1: DE-A-4243451
2. The document D1 discloses (the references in parentheses applying to this document): A tensioner for a belt of a drive of a motor vehicle, comprising: a first and second two idle pulley (1,2) designed to cooperate with respective belt runs of said belt; a first arm (2) bearing said first idle pulley; a second arm (1) hinged to said first arm (2) about a mobile axis and bearing said second idle pulley and elastic means (4) acting at least indirectly on said arms (1,2) for tensioning said belt.
3. The subject-matter of claim 1 therefore differs from this known tensioner in that said first arm is hinged about said mobile axis and by comprising a mobile element distinct from said first and second arm and mobile during functioning and said mobile axis being carried by said mobile element.
4. The problem to be solved by the present invention may therefore be regarded as how to avoid that the tensioner is only optimized for one functioning condition.

The solution is not known from nor is it rendered obvious by any available prior art document.

The solution proposed in claim 1 and dependent claims 2 - 6 of the present application can therefore be considered as involving an inventive step (Article 33(3) PCT).

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Known two-armed tensioners present some drawbacks, due to the criticality of the sizing of the spring, which is subjected to conditions of operation that vary within a very wide range of values and to the relative slowness of the response to the transient of reversal of the torque.

In particular, in the two modes of operation described, the pulleys are subject to translations, due to the reversal of the tensioned belt runs, which can reach high values especially when the belt has increased its own total length on account of the slackening that occurs typically in a belt towards the final stage of its service life.

Furthermore, the transient of reversal of the torque has a very short duration, and conventional two-armed tensioners tend to react to the swapping-round between the slack belt run and the tensioned belt run with a delay that causes temporary slipping and consequent damage to the belt.

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DISCLOSURE OF INVENTION

The purpose of the present invention is to provide a belt tensioner suitable for a drive for a "start-stop" system which will be free from the drawbacks described above.

The purpose of the present invention is achieved thanks to a tensioner for a belt drive as defined in Claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, there is now described a preferred embodiment, purely by way of non-limiting example and with reference to the attached drawings, in which:

- Figure 1 illustrates a front view of a belt drive for an internal-combustion engine comprising a two-armed

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Furthermore, a tensioner according to the preamble of claim 1 is also known from the embodiment of figure 4 of DE-A-4243451.

5 Such tensioner has a kinematically stiff structure that induces high peak stress in the belt during load conditions where the slack run and the tight run of the belt drive inverts, i.e. during start-up in starter alternator engines and during a sudden breaking of the vehicle due to the inertia of the electric machine.

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C L A I M S

1. A tensioner (2) for a belt (10) of a drive (1) of a motor vehicle, comprising: a first and a second idle pulleys (15, 16) designed to co-operate with respective belt runs (32, 34) of said belt (10); a first arm (13) bearing said first idle pulley (15); a second arm (14) hinged to said first arm (13) about a mobile axis (C) and bearing said second pulley (16); and elastic means (17) acting at least indirectly on said arms (13, 14) for tensioning said belt (10), said tensioner being characterized in that said first arm (13) is hinged about said mobile axis (C) and by comprising a mobile element (12) distinct from said first and second arm (13, 14) and mobile during functioning, said mobile axis (C) being carried by said mobile element (12).
2. The tensioner according to Claim 1, characterized in that said mobile element (12) is hinged about a fixed axis (A).
3. The tensioner according to claims 1 or 2, characterized in that said elastic means (17) are carried on said mobile element (12).
4. The tensioner according to any one of Claims 1 to 3, characterized in that said elastic means (17) co-operate with one of said arms (13, 14) and with said mobile element (12).
5. The tensioner according to any one of Claims 1 to 3, characterized in that said elastic means (17) act between said arms (13, 14).
6. The tensioner according to any one of the preceding claims, characterized in that it comprises arrest

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elements (42, 43) co-operating with said arms (13, 14)
for limiting opening of said arms (13, 14) with respect
to one another.

AMENDED SHEET